CURATING OPERATIONAL HISTORIAN DATA FOR DISTRIBUTION VIA A COMMUNICATION NETWORK

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority from U.S. Provisional Patent Application Ser. No. 62/221,424, filed Sep. 21, 2015, entitled "Operational Historian Data Pattern Detection and Communication Services." The entire contents of the above-identified application are expressly incorporated herein by reference, including the contents and teachings of any references contained therein.

TECHNICAL FIELD

[0002] Aspects of the present disclosure generally relate of the fields of networked computerized industrial control automation systems and networked computerized systems utilized to monitor, log, and display relevant manufacturing/ production events and associated data, and supervisory level control and manufacturing information systems. More particularly, aspects of the present disclosure relate to systems and methods for transforming stored data into actionable metrics for transmitting to various devices.

BACKGROUND

[0003] Such systems generally execute above a regulatory control layer in a process control system to provide guidance to lower level control elements such as, by way of example, programmable logic controllers or distributed control systems (DCSs). Such systems are also employed to acquire and manage historical information relating to industrial processes and their associated outputs. "Historization" is a vital task in the industry as it enables analysis of data representing historical information to improve industrial processes.

[0004] Typical industrial processes are extremely complex and receive substantially greater volumes of information than any human could possibly digest in its raw form. By way of example, it is not unheard of to have thousands of sensors and control elements (e.g., valve actuators) monitoring/controlling aspects of a multi-stage process within an industrial plant. These sensors are of varied type and report on varied characteristics of the process. Their outputs are similarly varied in the meaning of their measurements, in the amount of data sent for each measurement, and in the frequency of their measurements. As regards the latter, for accuracy and to enable quick response, some of these sensors/control elements take one or more measurements every second. Multiplying a single sensor/control element by thousands of sensors/control elements (a typical industrial control environment) results in an overwhelming volume of data flowing into the manufacturing information and process control system. Distributing the entire volume of data all user devices overburdens communications networks and unnecessarily utilizes network resources by sending data irrelevant to users associated with one or more user devices.

SUMMARY

[0005] Aspects of the disclosure permit targeted distributing of reports containing information that is of interest to particular users via a communications network. A curating architecture permits scoring each report based on interest level values and/or urgency level values. Routing reports to user devices based on the scores raises visibility of historical process control information without overburdening the communications network.

[0006] A method embodying aspects of the disclosure includes a curating service retrieving reports from a report database. Each report includes historical data relating to process control tags associated with a process control system. The curating service comprises processor-executable instructions executing on a processor. The curating service assigns a score to each retrieved report based on an interest level value and/or an urgency value. A scored report is routed from the curating service, by transmission via a communications network, to a user device when its score is at least equal to a threshold value. In response to the transmission, the report displays on the user device.

[0007] A system embodying aspects of the disclosure includes a processor, a computer-readable storage device, a report database, and a curating service. The report database stores reports that each includes historical data relating to process control tags associated with a process control system. The curating service comprises processor-executable instructions stored on the computer-readable storage device. When executed by the processor, the instructions retrieve reports from the report database, assign a score to each retrieved report based on an interest level value and/or an urgency value, and route a scored report to a user device. The scored report is routed by transmitting it via a communications network to the user device when the score is equal to or greater than a threshold value. In response to the transmission, the report displays on the user device.

[0008] Other objects and features will be in part apparent and in part pointed out hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 illustrates an operational historian data pattern detection and communication services system according to an embodiment.

[0010] FIG. 2 illustrates a reporting service of the operational historian data pattern detection and communication services system of FIG. 1.

[0011] FIG. 3 is an exemplary flow diagram illustrating an operation of the reporting service of FIG. 2.

[0012] FIG. 4 is an exemplary flow diagram illustrating an operation of a curating service of the operational historian data pattern detection and communication services system of FIG. 1.

[0013] FIG. 5 is an exemplary flow diagram illustrating an operation of an alert service of the operational historian data pattern detection and communication services system of FIG. 1

[0014] FIG. 6 is an exemplary flow diagram illustrating an operation of a search service of the operational historian data pattern detection and communication services system of FIG. 1

[0015] FIG. 7 illustrates an exemplary architecture of a computing device programmed to provide aspects of the operational historian data pattern detection and communication services system of FIG. 1.

[0016] FIG. 8 is an exemplary flow diagram illustrating an operation of the reporting service to provide unsupervised anomaly detection in time-series data according to another embodiment.